

We next investigated emissions from the BPL system deployed in the vicinity of the Whitehurst subdivision, where the system is deployed using underground wiring. No BPL signals were detected in this area that would be deemed capable of causing harmful interference to mobile amateur operations.

Finally, we took measurements at two fixed amateur locations, 5813 Heathill Court and 509 Wyndham Drive, included in the complaint. No BPL interference was observed on any amateur frequencies at these two locations. In fact, no BPL signals were observed at these locations on any of the frequencies used for BPL operations by Progress Energy. A third site included in the complaint, at 201 Wilbon Road 301B, was not visited due to a GPS mapping error and subsequent time constraints.

Our conclusions from this investigation are that the Progress Energy BPL trial in the Raleigh area is in compliance with the Commission's rules and that the measures implemented to notch frequencies used by the Amateur Radio Service to avoid the potential for harmful interference are effective. We neither found nor observed any BPL signal levels or effects from the Progress Energy BPL operation that appeared to have the potential to seriously degrade, obstruct or repeatedly interrupt mobile amateur communications or fixed amateur communications at the specified addresses. In a separate action, we are however instructing that Progress Energy and Amperion, its equipment vendor, to slightly widen the notch at the lower edge of the 10 meter band by 100 kHz to ensure protection of amateur operations at 28.0-28.1 MHz.

Sincerely,

Bruce A. Franca  
Deputy Chief,  
Office of Engineering and Technology

cc: George Dillon, FCC/EB  
Riley Hollingsworth, FCC/EB  
Len Anthony, Progress Energy Corporation  
Matt Oja, Progress Energy Corporation  
Bill Godwin, Progress Energy Corporation  
David Sumner, President, ARRL  
Chris Imlay, Counsel, ARRL

## James Burtle

---

**From:** Gary Pearce KN4AQ [kn4aq@arrl.net]  
**Sent:** Tuesday, October 05, 2004 4:34 PM  
**To:** Sheryl Wilkerson; Anh Wride; Alan Stillwell; James Burtle  
**Cc:** Riley Hollingsworth; w1rfi@arrl.org  
**Subject:** "Notching" BPL signals on Amateur Radio/SWL Bands

Greetings, FCC staff,

I have seen several references saying that there is a general feeling at the FCC that notching has been an effective tool for mitigation of BPL signal interference to Amateur Radio.

I have been closely involved in monitoring the recently concluded Progress Energy BPL trial near Raleigh, North Carolina, and I would like to briefly relate my observations that contradict that conclusion.

Progress Energy and their vendor, Amperion, used notching to reduce the BPL signal level on two of the overhead lines involved in their trial. One line had signals crossing the 12 meter band, and the other had signals crossing the 17 meter band.

The notches did indeed reduce the signal level. In his investigation, James Burtle reported that "Measurements and observations with test equipment and a high quality amateur receiver show little field strength or observable signal levels in the notched bands."

My experience was a little different. When I parked my mobile station across the street from the active power line, I could easily hear the BPL signals inside the notched bands. The signals were weak, but they were strong enough to cause harmful interference to other weak Amateur Radio signals, and were annoying to listen to while following the common Amateur Radio practice of tuning across our band looking for signals from other Amateur stations.

A few quick points to add:

- We keep pointing out that there were no Amateur Radio operators living inside the Progress Energy trial area. Our mobile observations were intended to be representative of the fixed stations that will be encountered in a general roll out of the system used in the trial (albeit with the reduced efficiency of mobile antennas).

Extrapolating from our mobile observation, in a general roll out the notched signals would cause harmful interference to fixed stations within a few blocks of the power line. This was demonstrated in practice by Jim Spencer in Cedar Rapids, Iowa, whose home was about 500 feet from the Amperion trial system in that city. After months of trying, Amperion was unable to reduce the signal at his home station below a clearly harmful level. Allient Energy cited the interference as one of the factors that caused them to end the trial early.

- In attempting to move and notch spectrum to mitigate interference, Amperion demonstrated only limited control of their hardware.

In their first change on the overhead line feeding the Holland Meadows subdivision south of Raleigh, they attempted to place a BPL signal across the spectrum that lies between the 20 and 15 meter Amateur bands, with a notch across the 17 meter band. They "missed the mark" at the low end of the spectrum block and ended up with a full-strength signal across the top 60 kHz of the 20 meter band (from 14.290 to 14.350 MHz).

Despite several complaints to Progress Energy and the FCC, this signal remained in place from May until August 2004. When it was finally moved, a few weeks before the system was shut down completely, Amperion's limited control caused them to push the BPL signals up the spectrum and cover the bottom 100 kHz of the 15 meter band with a full-strength signal (while they did clear the top 60 kHz of the 20 meter band).

Mr. Burtle's investigation inexplicably failed to document this signal, even though it was prominently mentioned in the complaint he was responding to (it was still in the 20 meter band when he observed the trial in late June, 2004).

- The Amperion BPL system does not contain itself to the intended spectrum blocks. Rather, signal "spills out" into adjacent spectrum. These overlapping signals are weaker than the main signal, and fade slowly as one tunes across the spectrum away from the edge of the main signal block. I can hear it well for 50 to 100 kHz from the edge of their main blocks, carrying the signals well into the adjacent Amateur Radio bands. The signal level is similar to the notched band signals. Again, the problem will be magnified for fixed stations near the lines. My much less efficient mobile can only demonstrate that the problem exists.

- Absolutely no consideration has been given to interference to international shortwave broadcast (SWBC) reception. I included several specific references to such interference in my complaints (one of which was copied in whole in the complaint filed by Tom Brown N4TAB, investigated by James Burtle - I've never received a reply to any of my own complaints). None of the SWBC bands are notched in any way, and weak to moderately strong SW signals are obliterated by the BPL signal when my vehicle is in the vicinity of the power line.

#### CONCLUSION

Can notching work to adequately mitigate interference to Amateur and Shortwave Broadcast radio? I would have to assume that eventually the BPL equipment manufacturers would be able to design hardware and software that can do the job. The equipment in place today does not.

Sincerely,

Gary Pearce KN4AQ  
116 Waterfall Ct.  
Cary, NC 27513  
919-380-9944  
kn4aq@arrl.net

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Gary Pearce KN4AQ	editor, SERA Repeater Journal
Cary, NC	www.sera.org
919-380-9944	kn4aq@sera.org
kn4aq@arrl.net	
AOL/Yahoo Instant Messenger: KN4AQ	
(send e-mail to be put on my "buddy list")	

## Alan Stillwell

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**From:** James Burtie  
**Sent:** Wednesday, March 31, 2004 8:10 AM  
**To:** Alan Scime; Alan Stillwell; Bruce Franca; Bruce Romano; Anh Wride  
**Subject:** FW: Complaint of Gary Pearce

-----Original Message-----

**From:** Anthony, Len [mailto:len.anthony@pgnmail.com]  
**Sent:** Wednesday, March 31, 2004 7:03 AM  
**To:** James Burtie  
**Cc:** Godwin, Bill; Oja, Matt  
**Subject:** Complaint of Gary Pearce

Bill Godwin, a representative of Progress Energy, has contacted Mr. Pearce and arranged to meet with him and take joint measurements of the interference, or lack thereof, to ham radio transmissions allegedly caused by BPL at the Woodchase and Holland Meadows Subdivisions in Raleigh. Progress Energy believes that the first step in resolving Mr. Pearce's complaint is to reach a common understanding as to the actual measured impact on ham radio operation in these areas. PEC will update you once the measurements have been taken. Len Anthony

# TEST REPORT



Certification # 1367-01

## Laboratory ID

✓ PRODUCT SAFETY ENGINEERING, INC.  
12955 Bellamy Brothers Boulevard  
Dade City, Florida 33525 USA  
PH (352) 588-2209 FX (352) 588-2544

## Submitter ID

✓ Main.net Power Line Communications Inc.  
12355 Sunrise Valley Dr.  
Suite 150  
Reston, VA 20190

✓ Report Issue Date: 14 AUG 03  
Sample S/N: AN PLS10010-000  
Sample Receipt Date: 14 JUL 03

Test Report Number: 03F332  
Model Designation: Nt Plus 3.0  
Product Description: Carrier Current  
Modem (indoor)

Sample Test Date: see data sheets

Marketing Approval \_\_\_\_\_

Description of non-standard test method or test practice: *None*

Estimated Measurement Uncertainty: *Not Applicable*

Special limitations of use: *None*

Traceability: *reference standards of measurement have been calibrated by a competent body using standards traceable to the NIST.*

According to testing performed at Product Safety Engineering, Inc., the above-mentioned unit is in compliance with the electromagnetic compatibility requirements defined in regulations indicated on page (3) of the test report. The test results contained herein relate only to the model(s) identified above. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics.

As the responsible EMC Project Engineer, I hereby declare that the equipment tested as specified above conforms to the requirements indicated on page (3) of the test report.

Signature David Foerstner Name David Foerstner

Title Engineering Group Leader Date 14 AUG 03

Reviewed by: John E. Hall  
Approved Signatory John E. Hall Date 14 AUG 03

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Test Report Number 03F332

Product Safety Engineering, Inc 12955 Bellamy Brothers Blvd. Dade City, FL 33525  
Tel (352) 588-2209 Fax (352) 588-2544

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Test Report Number 03F332

## EMISSIONS TEST REGULATIONS :

The emissions tests were performed according to following regulations:

☐ - EN 50081-1 : 1992

☐ - EN 50081-2 : 1995

☐ - EN 55011 : 1998 / A1:1999

☐ - Group 1

☐ - Group 2

☐ - Class A

☐ - Class B

☐ - EN 55013 : 1990 / A12:1994 / A13:1996 / A14:1999

☐ - EN 55014 : 1993 / A1:1997

☐ - Household appliances and similar

☐ - Portable tools

☐ - Semiconductor devices

☐ - EN 55022 : 1998

☐ - Class A

☐ - Class B

☐ - AS/NZS 3548:1995

☐ - Class A

☐ - Class B

☐ - ICES-003

☐ - Class A

☐ - Class B

☐ - CNS 13438

☐ - Class A

☐ - Class B

☐ - VCCI : 1999

☐ - Class A

☐ - Class B

☐ - FCC Part 15

☐ - Class A

☐ - Class B

☐ - Certification

☒ - Verification (Carrier Current Device Only)

☐ - Declaration of Conformity

☐ - FCC Part 18

Test Report Number 03F332

**Environmental conditions during testing:**

	LAB	OATS
Temperature: *	_____	: _____
Relative Humidity: **	_____	: _____

\* The ambient temperature during the testing was within the range of (50° - 104° F) unless indicted above.

\*\* The humidity levels during the testing was within the range of (10% - 90%) relative humidity unless indicated above.

Power supply system : 110 Volts 60 Hz SINGLE phase

**Sign Explanations:**

- ☐ - not applicable
- ☒ - applicable

*Test Report Number 03F332*

Product Safety Engineering, Inc 12955 Bellamy Brothers Blvd. Dade City, FL 33525  
Tel (352) 588-2209 Fax (352) 588-2544



### Emissions Test Conditions: CONDUCTED EMISSIONS (Interference Voltage)

The *CONDUCTED EMISSIONS (INTERFERENCE VOLTAGE)* measurements were performed at the following test location:

☐ - Test not applicable

- ☐ - Darby Test Site (Open Area Test Site)
- ☐ - Darby Laboratory

**Test equipment used :**

Model Number	Manufacturer	Description	Serial Number
<input type="checkbox"/> - 8028-50	Solar	50 $\Omega$ LISN	829012, 829022
<input type="checkbox"/> - 3825/2	Solar	50 $\Omega$ LISN	924840
<input type="checkbox"/> - EMC-30	Electro-Metrics	EMI Receiver	191
<input type="checkbox"/> - 8566B	Hewlett-Packard	Spectrum Analyzer	2421A00526
<input type="checkbox"/> - 85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00209
<input type="checkbox"/> - 85662A	Hewlett Packard	Analyzer Display	2403A07352
<input type="checkbox"/> - 8028-50	Solar	50 $\Omega$ LISN	903725, 903726
<input type="checkbox"/> - FCC-TLISN-T4	Fisher Custom Com.	Telecom ISN	20072

### Emissions Test Conditions: RADIATED EMISSIONS (Magnetic Field)

The *RADIATED EMISSIONS (MAGNETIC FIELD)* measurements were performed at the following test location:

- ☐ - Darby Test Site (Open Area Test Site)
- ☐ - (3) Typical residential locations
- ☐ -

at a test distance of :

- ☐ - 3 meters
- ☐ - 10 meters

☐ - Test not applicable

**Test equipment used :**

Model Number	Manufacturer	Description	Serial Number
<input type="checkbox"/> - 96005	Eaton	Log Periodic Antenna	1099
<input type="checkbox"/> - BIA-25	Electro-Metrics	Biconical Antenna	4283
<input type="checkbox"/> - E7402A	Agilent	Spectrum Analyzer	US40240204
<input type="checkbox"/> - 85662A	Hewlett-Packard	Analyzer Display	2403A07352
<input type="checkbox"/> - 85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00209
<input type="checkbox"/> - ALR-30M	Electro-Metrics	Loop Antenna	824
<input type="checkbox"/> - 8447D	Hewlett Packard	Preamplifier	2944A06832
<input type="checkbox"/> - EMC-30	Electro-Metrics	EMI Receiver	191
<input type="checkbox"/> - ALA-130/A	Antenna Research	Loop Antenna	106

Test Report Number 03F332

The **RADIATED EMISSIONS (ELECTRIC FIELD)** measurements, in the frequency range of 30 MHz-500 MHz, were tested in a horizontal and vertical polarization at the following test location :

☐ - Test not applicable

- ☐ - Darby Site (Open Area Test Site)
- ☐ - Darby Lab
- ☒ - (3) Typical residential installations

at a test distance of :

- ☒ - 3 meters
- ☐ - 10 meters
- ☐ - 30 meters

**Test equipment used :**

Model Number	Manufacturer	Description	Serial Number
<input checked="" type="checkbox"/> - 96005	Eaton	Log Periodic Antenna	1099
<input checked="" type="checkbox"/> - BIA-25	Electro-Metrics	Biconical Antenna	4283
<input checked="" type="checkbox"/> - E7402A	Agilent	Spectrum Analyzer	US40240204
<input type="checkbox"/> - 85662A	Hewlett-Packard	Analyzer Display	2403A07352
<input type="checkbox"/> - 85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00209
<input type="checkbox"/> - 8447D	Hewlett-Packard	Preamplifier (26dB)	2944A06832
<input type="checkbox"/> - EMC-30	Electro-Metrics	EMI Receiver	191
<input type="checkbox"/> - 8568B	Hewlett Packard	Spectrum Analyzer	2407A03213
<input type="checkbox"/> - 85650A	Hewlett Packard	Quasi-Peak Adapter	2043A00358
<input type="checkbox"/> - 85662A	Hewlett Packard	Analyzer Display	2340A05806
<input type="checkbox"/> - LPA30	Electro-Metrics	Log Periodic	2280
<input type="checkbox"/> - BIA 30	Electro-Metrics	Biconical Antenna	3852

**Emissions Test Conditions): INTERFERENCE POWER**

The **INTERFERENCE POWER** measurements were performed by using the absorbing clamp on the mains and interface cables in the frequency range 30 MHz - 300 MHz at the following test location :

☒ - Test not applicable

- ☐ - Darby Lab
- ☐ -

**Test equipment used :**

Model Number	Manufacturer	Description	Serial Number
<input type="checkbox"/> - MDS-21	Rhode&Schwarz	Absorbing Clamp	8608447020
<input type="checkbox"/> - 8566B	Hewlett-Packard	Spectrum Analyzer	2421A00526
<input type="checkbox"/> - 85662A	Hewlett-Packard	Analyzer Display	2403A07352
<input type="checkbox"/> - 85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00209
<input type="checkbox"/> - 8447D	Hewlett-Packard	Amplifier (26 dB)	2944A06832
<input type="checkbox"/> - EMC-30	Electro-Metrics	EMI Receiver	191

Test Report Number 03F332

The **EQUIVALENT RADIATED EMISSIONS** measurements in the frequency range      GHz -      GHz  
were performed in a horizontal and vertical polarization at the following test location :

- ☐ - Darby Test Site (Open Area Test Site)
- ☐ -
- ☐ -
- ☐ -

at a test distance of:

- ☐ - 1 meters
- ☐ - 3 meters
- ☐ - 10 meters

☒ - Test not applicable

**Test equipment used :**

Model Number	Manufacturer	Description	Serial Number
<input type="checkbox"/> - 8566B	Hewlett-Packard	Spectrum Analyzer	2421A00526
<input type="checkbox"/> - 85662A	Hewlett-Packard	Analyzer Display	2403A07352
<input type="checkbox"/> - 85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00209
<input type="checkbox"/> - 8449B	Hewlett-Packard	Preamplifier	3008A00320
<input type="checkbox"/> - 3115	Electro-Mechanics	Double Ridge Guide Horn	3810

The **ANTENNA TERMINAL DISTURBANCE VOLTAGE** in the frequency range 30 MHz - 1,000 MHz were performed.

- ☐ - Darby Test Site (Open Area Test Site)
- ☐ - Laboratory
- ☐ -
- ☐ -

☒ - Test not applicable

Model Number	Manufacturer	Description	Serial Number
<input type="checkbox"/> - 2F9-3C4-3C5	Wavecom	UHF PAL TV Modulator	185879
<input type="checkbox"/> - 2F1-3C4-3C5	Wavecom	VHF PAL TV Modulator	157728
<input type="checkbox"/> - A-8000	IFR	Spectrum Analyzer	1306
<input type="checkbox"/> - 8648B	Hewlett-Packard	Signal Generator	3623A01433
<input type="checkbox"/> - 8648B	Hewlett-Packard	Signal Generator	3623A01477
<input type="checkbox"/> - LMV-182A	Leader	RMS Milli-Voltmeter	8010091
<input type="checkbox"/> - 3202	Krhon-Hite	Active filter	5899
<input type="checkbox"/> - FMT115	Leaming	FM Modulator	NONE
<input type="checkbox"/> - 371	UDT	Optical power meter	06657
<input type="checkbox"/> - TSG95	Tektronix	PAL video / Audio generator	B028883
<input type="checkbox"/> -			

Test Report Number 03F332

### **Equipment Under Test (EUT) Test Operation Mode - Emission tests :**

The device under test was operated under the following conditions during emissions testing:

- ☐ - Standby
- ☐ - Test program (H - Pattern)
- ☐ - Test program (color bar)
- ☐ - Test program (customer specific)
- ☒ - Practice operation
- ☐ - Normal Operating Mode
- ☐ -

### **Configuration of the device under test:**

- ☒ - See System Under Test Information in Appendix B

### **Rationale for EUT setup / configuration:**

The EUT was placed in a constant transmit mode during the entire testing. Two of the homes chosen were served by underground electrical service and the third home was served by overhead electric service per the request of the FCC.

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*Test Report Number 03F332*

Product Safety Engineering, Inc 12955 Bellamy Brothers Blvd. Dade City, FL 33523  
Tel (352) 588-2289 Fax (352) 588-2544

## Emission Test Results:

### Conducted emissions 10/150/450 kHz - 30 MHz

The requirements are ☒ - MET ☐ - NOT MET  
Minimum limit margin 15 dB at 1.69 MHz  
Remarks:

### Radiated emissions (magnetic field) 10 kHz - 30 MHz

The requirements are ☒ - MET ☐ - NOT MET  
Minimum limit margin 0.2 dB at 14.9 MHz  
Remarks:

### Radiated emissions (electric field) 30 MHz - 500 MHz

The requirements are ☒ - MET ☐ - NOT MET  
Minimum limit margin >10 dB at MHz  
Remarks: No emissions were observed between (30 - 500) MHz which were a function of the transmitter.

### Interference Power at the mains and interface cables 30 MHz - 300 MHz

The requirements are ☐ - MET ☐ - NOT MET  
Minimum limit margin dB at MHz  
Remarks:

### Radiated emissions GHz - GHz

The requirements are ☐ - MET ☐ - NOT MET  
Minimum limit margin dB at GHz  
Remarks:

### Antenna Terminal Disturbance Voltage 30 MHz - 1,000 MHz

The requirements are ☐ - MET ☐ - NOT MET  
Minimum limit margin dB at MHz  
Remarks:

Test Report Number 03F332

## GENERAL REMARKS:

The test equipment utilized during the radiated emissions testing consisted of a spectrum analyzer (EMC Analyzer) which was powered via a (12) volt "DC" marine deep cycle battery. The analyzer and battery were strapped to a handcart for ease in movement. The analyzer was connected to each antenna via a (50) foot coaxial cable. The analyzer was programmed to correct the raw readings to compensate for cable loss and antenna factors.

The FCC states the limits for the radiated emissions made at frequencies between (1.705 - 30) MHz at a (30) meter distance. We used (40) dB per decade as the extrapolation factor to adjust the limit from a (30) meter distance to a (10) meter distance as allowed in Part 15.31(f)(2). The limit for radiated emissions below (30) MHz, extrapolated to a (10) meter distance, is (48.6) dBuV/m.

The radiated data collected is reported while using each a peak, quasi-peak and average detector for information purposes only. The limit is compared to the quasi-peak data only. No emissions were observed between (1.705 -4) MHz.

We made measurements at each azimuth at each house in both horizontal and vertical polarities between (30 - 500) MHz. The only required measurements for conducted emissions are between (0.535 - 1.705) MHz and are included in the test report. **NOTE: The power level was set to (5) during all of the testing.**

## SUMMARY:

The requirements according to the technical regulations are

- ☒ - met
- ☐ - not met.

The device under test does

- ☒ - fulfill the general approval requirements mentioned on page 3.
- ☐ - not fulfill the general approval requirements mentioned on page 3.

Testing Start Date 07/14/2003

Testing End Date: 07/23/2003

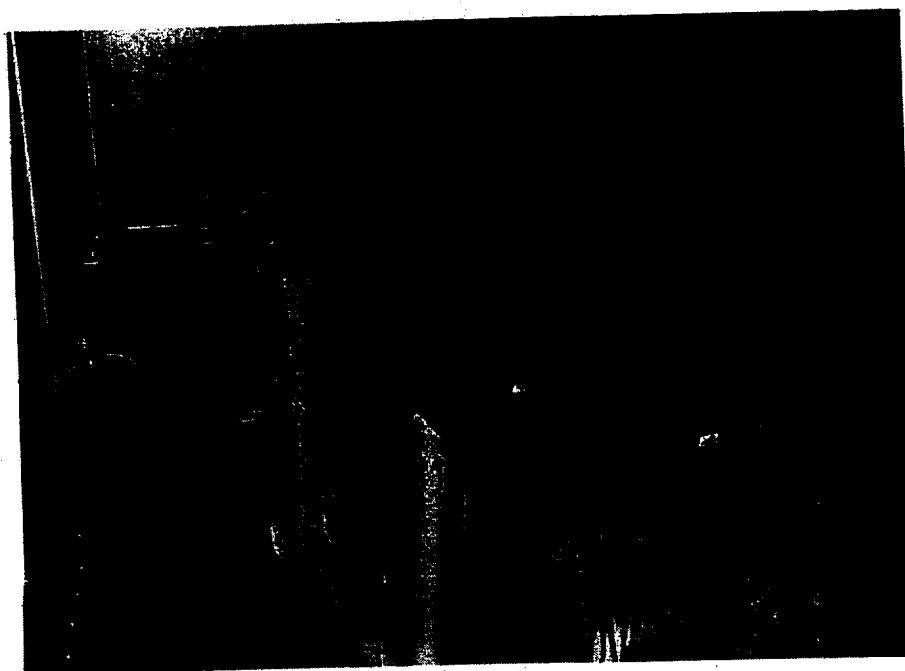
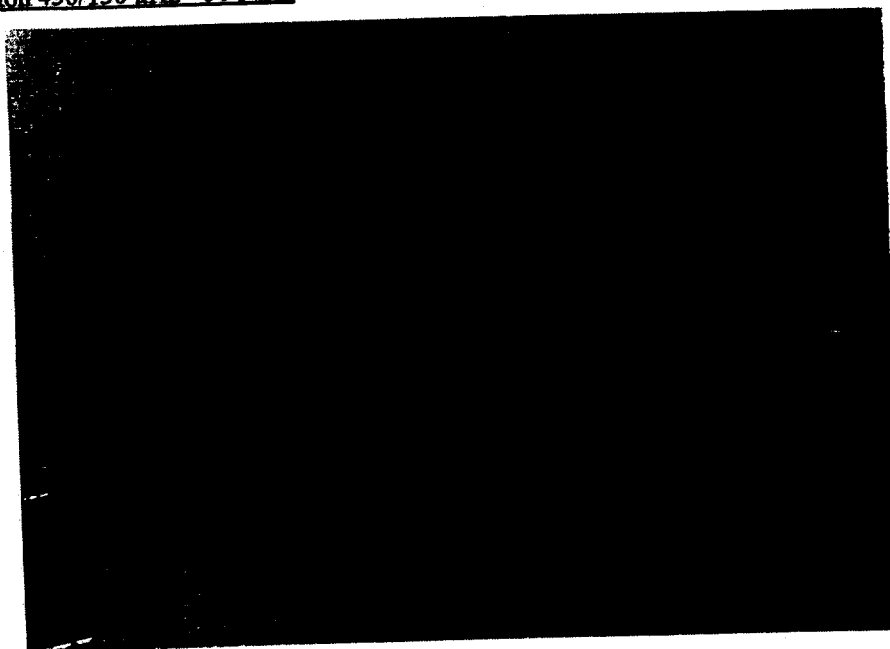
- PRODUCT SAFETY ENGINEERING INC -

Test Report Number 03F332

Product Safety Engineering, Inc 12955 Bellamy Brothers Blvd. Dade City, FL 33525  
Tel (352) 588-2209 Fax (352) 588-2544

Test-setup photo(s):

Conducted emission 450/150 kHz - 30 MHz



*Test Report Number 03F332*

Product Safety Engineering, Inc 12955 Bellamy Brothers Blvd. Dade City, FL 33525  
Tel (352) 588-2209 Fax (352) 588-2544

Test-setup photo(s):  
Radiated emission 30 MHz - 1000 MHz

**SEE APPENDIX A**

*Test Report Number 03F332*

Product Safety Engineering, Inc. 12955 Bellamy Brothers Blvd. Dade City, FL 33525  
Tel (352) 588-2209 Fax (352) 588-2344



# **APPENDIX**

## **A**

### **Test Equipment Calibration Information & Test Data Sheets**

## TEST EQUIPMENT CALIBRATION INFORMATION

Manufacturer	Model	Description	Serial Number	Cal Due
Hewlett Packard	8566B	Spectrum Analyzer	2421A00526	08/14/04
Hewlett Packard	85662A	Display	2403A07352	08/14/04
Hewlett Packard	85650A	Quasi-Peak Adapter	2043A00209	08/14/04
Hewlett Packard	8447D	Preamp 0.1 - 1,000 MHz	2944A06832	11/13/03
Hewlett Packard	8568B	Spectrum Analyzer	2407A03213	08/14/04
Hewlett Packard	85682A	Display	2340A05806	08/14/04
Hewlett Packard	85650A	Quasi-Peak Adapter	2043A00358	08/14/04
Hewlett Packard	8447D	Preamp 0.1 - 1,000 MHz	2944A06901	08/02/03
Hewlett Packard	8447D	Preamp 0.1 - 1,000 MHz	1937A03247	07/17/04
Hewlett Packard	8449B	Preamp 1 - 26.5 GHz	3008A00320	11/08/03
Hewlett Packard	8648B	Signal Generator	3443U00312	04/24/04
Hewlett Packard	8672A	Signal Generator	2211A02426	11/14/03
Eaton	96005	Log Periodic Antenna	1099	01/24/04
Electro-Metrics	LPA 30	Log Periodic Antenna	2280	12/06/03
Electro-Metrics	BIA 30	Biconical Antenna	3852	12/05/03
Electro-Metrics	BIA 25	Biconical Antenna	4283	01/22/04
Electro-Mechanics	3115	Double Ridge Guide Ant.	3810	11/07/03
Electro-Metrics	ALR30M	Magnetic Loop Antenna	824	12/12/03
Solar	8012	LISN	924840	12/29/03
Solar	8028	LISN	829012/809022	12/19/03
Solar	8028	LISN	903725/903726	11/18/03
Schwartzbeck	MDS-21	Absorbing Clamp	02581	09/13/03
Leader	LFG1310	Function Generator	8060233	04/24/04
IFR Systems	A-8000	Spectrum Analyzer	1306	11/13/03
Electro-Metrics	EMC-30	EMI Receiver	191	04/24/04
Antenna Research	ALA-130/A	Loop Antenna	106	03/14/04
Radio Shack	63-867	Temp/Hygrometer	N/A	04/18/04
Radio Shack	63-867A	Temp/Hygrometer	N/A	04/28/04

## Emissions Data

A3

House #1					House #2					House #3				
Azimuth	Freq MHz	Peak dBuV/m	QP dBuV/m	AVG dBuV/m	Azimuth	Freq MHz	Peak dBuV/m	QP dBuV/m	AVG dBuV/m	Azimuth	Freq MHz	Peak dBuV/m	QP dBuV/m	AVG dBuV/m
1					1					1				
1	4.5	46.1	37.0	26.0	1	5.0	48.1	42.5	27.1	1	5.0	49.1	42.3	27.3
2	9.0	44.1	37.7	24.9	2	8.8	52.6	48.0	28.4	2	9.2	52.0	46.6	27.9
3	11.7	50.0	41.3	34.3	3	12.3	51.4	44.4	28.4	3	11.5	58.0	48.3	26.8
4	12.3	48.8	41.3	25.3	4	14.2	49.2	43.6	21.8	4	12.0	50.3	46.0	26.6
5	15.5	33.4	27.7	24.2	5	15.0	49.3	41.3	28.0	5	13.2	44.8	37.0	23.8
6	17.2	47.0	42.5	20.9	6	17.0	45.1	40.8	20.8	6	14.5	40.3	33.2	20.1
2					2					2				
1	4.5	47.3	37.9	26.1	1	8.8	51.3	44.2	26.2	1	5.0	51.9	46.3	28.2
2	8.8	44.8	37.5	24.8	2	8.9	49.9	44.8	28.1	2	11.1	50.3	43.0	25.8
3	12.3	50.2	42.9	25.7	3	12.8	46.5	39.3	22.3	3	12.2	46.4	38.8	27.6
4	15.9	40.1	36.2	19.0	4	14.1	50.1	43.8	21.4	4	15.0	50.3	41.0	23.9
5					5	14.7	48.1	40.0	20.0	5	17.0	48.4	44.1	22.2
6														
3					3					3				
1	4.5	48.8	44.8	27.4	1	4.5	44.6	40.4	28.8	1	5.0	51.5	44.9	28.0
2	8.5	44.4	38.4	25.2	2	9.0	47.5	41.8	33.7	2	11.3	51.2	44.2	25.8
3	11.3	46.3	38.5	24.9	3	12.1	42.6	38.5	25.1	3	14.0	43.9	36.7	20.1
4	13.0	41.1	33.1	19.2	4	14.1	48.8	42.6	21.3	4	15.0	49.6	42.0	21.6
5	15.8	43.8	38.7	19.8						5	17.0	47.2	41.7	21.0
6	17.0	47.9	40.6	20.1										
4					4					4				
1	4.5	47.3	43.2	27.2	1	20.2	40.0	32.8	17.9	1	5.0	52.5	45.2	27.3
2	9.2	50.4	48.4	24.2	2	15.1	40.4	34.1	22.5	2	9.9	43.9	38.0	24.5
3	12.3	45.9	38.6	25.9	3	11.3	51.4	48.0	26.9	3	11.0	49.0	41.3	26.7
4	13.2	39.2	31.2	18.8	4	4.2	45.7	40.8	28.5	4	13.2	45.1	37.4	19.9
5										5	14.9	46.6	41.4	20.9
6														
5					5					5				
1	17.0	47.9	41.2	20.7	1	4.1	50.5	46.1	28.2	1	5.0	52.3	45.8	28.1
2	16.0	46.1	39.8	19.8	2	7.0	49.2	42.7	28.0	2	11.0	45.3	37.8	24.7
3	12.0	44.6	35.9	24.5	3	9.9	50.7	44.7	27.2	3	11.3	47.0	40.8	25.0
4	4.5	45.0	39.4	26.2	4	11.2	50.8	43.2	28.0	4	14.8	45.0	39.5	20.0
5					5	12.6	40.9	36.9	43.3	5	16.0	42.7	36.9	18.8
6					6	20.0	43.0	38.6	19.5					
6					6					6				
1	4.6	45.3	39.5	20.7	1	20.3	42.4	35.8	18.4	1	5.1	48.4	42.5	27.2
2	9.3	47.2	39.5	25.2	2	14.9	48.6	43.1	21.9	2	11.3	47.1	39.3	25.0
3	12.2	45.3	38.9	25.3	3	14.7	52.4	47.1	23.2	3	13.3	39.5	31.6	18.9
4					4	12.3	49.6	45.4	27.8	4	14.1	39.1	33.7	19.0
5					5	11.0	53.5	48.3	28.4	5	16.0	38.4	32.7	18.2
6					6	4.7	51.1	44.2	27.4					

44

7	1	4.4	47.8	41.9	40.0	7	1	4.2	49.5	43.7	28.9	7	1	5.0	50.3	44.8	28.0
	2	8.9	42.4	38.3	24.9		2	10.0	48.3	38.4	28.7		2	5.8	45.2	39.7	25.5
	3	11.2	44.4	37.3	18.3		3	11.1	50.5	43.9	28.3		3	9.9	41.7	34.5	24.5
	4						4	14.9	51.4	48.2	23.4		4	11.0	46.6	39.2	24.7
	5												5	13.5	44.1	35.1	19.2
	6																
8	1	11.3	45.2	39.7	25.5	8	1	4.3	49.6	43.1	28.9	8	1	4.9	49.5	43.0	27.4
	2	12.3	42.8	34.1	19.0		2	9.0	54.8	48.3	31.0		2	5.9	50.3	42.8	26.1
	3	14.2	42.8	34.3	18.9		3	10.0	52.8	47.8	30.6		3	11.0	45.2	38.6	25.0
	4						4	11.2	52.2	47.0	30.4		4	13.5	45.9	38.0	19.8
	5						5	14.5	53.1	48.5	28.0		5	17.0	45.4	38.6	19.8
	6																
9	1	4.5	51.9	47.4	27.4	9	1	14.9	49.0	43.3	24.8	9	1	5.0	49.1	43.5	27.8
	2	8.8	49.6	45.4	27.8		2	15.0	51.6	46.8	26.0		2	11.0	46.7	40.2	25.3
	3	12.3	42.7	38.8	25.3		3	11.0	51.2	46.0	30.0		3	14.0	42.6	34.1	19.0
	4						4	9.0	54.1	46.3	30.6		4	17.1	40.2	35.3	18.1
	5						5	4.1	48.5	43.8	31.4						
	6																
10	1	No Data				10	1	4.2	50.3	44.6	31.3	10	1	5.0	54.1	48.2	28.9
	2	No Data					2	8.8	51.8	44.7	30.2		2	11.3	52.8	45.8	28.4
	3	No Data					3	12.4	54.5	48.5	30.4		3	12.0	49.7	46.0	27.1
	4	No Data					4	14.9	51.8	46.3	25.5		4	15.0	47.8	41.5	21.0
	5	No Data					5	15.0	54.8	47.9	26.4		5	16.8	44.3	36.8	18.8
	6	No Data					6	16.0	53.3	48.8	25.1		6				
		No Data															
11	1	No Data				11	1	4.1	52.0	47.6	28.0	11	1	5.0	53.7	47.9	28.6
	2	No Data					2	10.1	53.0	46.9	27.1		2	11.3	51.0	44.2	26.8
	3	No Data					3	10.9	50.4	44.3	26.2		3	12.5	45.0	40.1	24.1
	4	No Data					4	14.3	50.6	44.3	22.0		4	15.0	48.9	43.9	22.9
	5	No Data					5	14.9	53.2	48.4	24.4		5	16.9	44.9	39.9	20.2
	6	No Data					6	20.2	44.8	37.7	18.7						
		No Data															
12	1	9.0	41.9	38.1	24.5	12	1	4.2	54.6	48.4	28.8	12	1	5.0	54.1	47.0	28.0
	2	8.8	42.7	38.3	23.8		2	4.6	52.0	46.8	27.8		2	5.8	47.5	41.8	25.3
	3	11.1	37.2	31.2	23.5		3	6.0	51.9	47.4	27.4		3	10.1	52.0	44.8	26.9
	4						4	10.0	52.1	47.2	27.6		4	11.3	54.1	47.0	28.4
	5						5	10.9	53.2	48.1	27.6		5	13.2	49.6	42.3	21.0
	6						6	14.4	52.2	48.0	22.6						

13							13							13					
	1	4.5	50.2	42.3	26.8			No Data							1	4.9	48.0	41.6	26.8
	2	9.0	46.6	38.7	25.6			No Data							2	5.0	52.4	47.1	29.2
	3	18.0	39.3	31.2	17.8			No Data							3	11.2	49.8	44.0	26.0
	4							No Data							4	12.0	51.1	46.3	26.7
	5							No Data							5	15.0	53.8	46.0	22.6
	6							No Data							6	17.0	51.6	44.8	23.4
14							14							14					
	1	4.5	54.9	46.5	27.9			1	15.0	52.0	44.5	26.6			1	5.1	52.6	46.8	28.1
	2	9.0	49.5	40.8	25.5			2	14.0	47.6	41.8	22.0			2	11.2	54.2	47.5	26.7
	3	14.1	38.5	32.5	18.7			3	12.0	48.4	43.8	26.4			3	12.0	52.9	44.2	25.7
	4	16.9	41.9	36.4	19.4			4	10.1	47.0	41.1	25.9			4	15.0	54.0	44.9	22.5
	5	18.0	42.9	34.0	18.4			5	6.3	52.6	46.0	26.4			5	17.0	52.1	47.8	23.5
	6							6	5.0	51.7	45.6	27.8							
15							15							15					
	1	4.5	46.2	42.0	27.0			1	14.8	49.8	46.6	22.2			1	5.1	53.8	47.8	28.6
	2	9.0	47.3	41.5	25.6			2	14.3	47.2	42.8	21.5			2	10.2	50.6	44.0	28.1
	3							3	12.3	48.2	41.4	25.2			3	11.0	53.5	47.0	27.0
	4							4	10.8	46.5	41.3	25.3			4	12.9	49.6	42.1	21.7
	5							5	7.2	51.3	43.8	25.9			5	15.0	53.4	47.8	25.7
	6														6	17.0	54.0	46.8	22.7
16							16							16					
	1	4.4	44.1	35.9	26.1			1	14.9	52.7	47.9	23.6			No Data				
	2	8.8	47.2	41.3	25.5			2	12.4	45.9	41.8	25.4			No Data				
	3	16.0	44.2	38.1	18.9			3	10.9	48.2	42.3	25.6			No Data				
	4	18.0	38.9	32.0	17.8			4	7.0	50.8	44.4	26.2			No Data				
	5							5	8.2	51.6	46.6	26.9			No Data				
	6							6	5.1	50.3	44.7	27.5			No Data				

# Product Safety Engineering

MAIN.NET PLC, INC

Date : 07/23/03  
Technician : CHIP FOERSTNER  
Test Method : FCC PART 15  
Equipment : NT PLUS 3.0  
Mode of Op. : TX AT POWER LEV#5  
Serial No. : PN PLS10010-000

Time : 13:37:43.51  
Test Equip. : EMC-30  
Test Number : 1  
Sensor Loc. : LINE  
Sensor Pol. :  
Ext. Atten. : 0 dB

EMC-30 SETTINGS  
Detector QuasiPeak  
Bandwidth CISPR  
Dump/Dwell IN/A  
RF Atten. 10 dB  
IF Atten. 10 dB

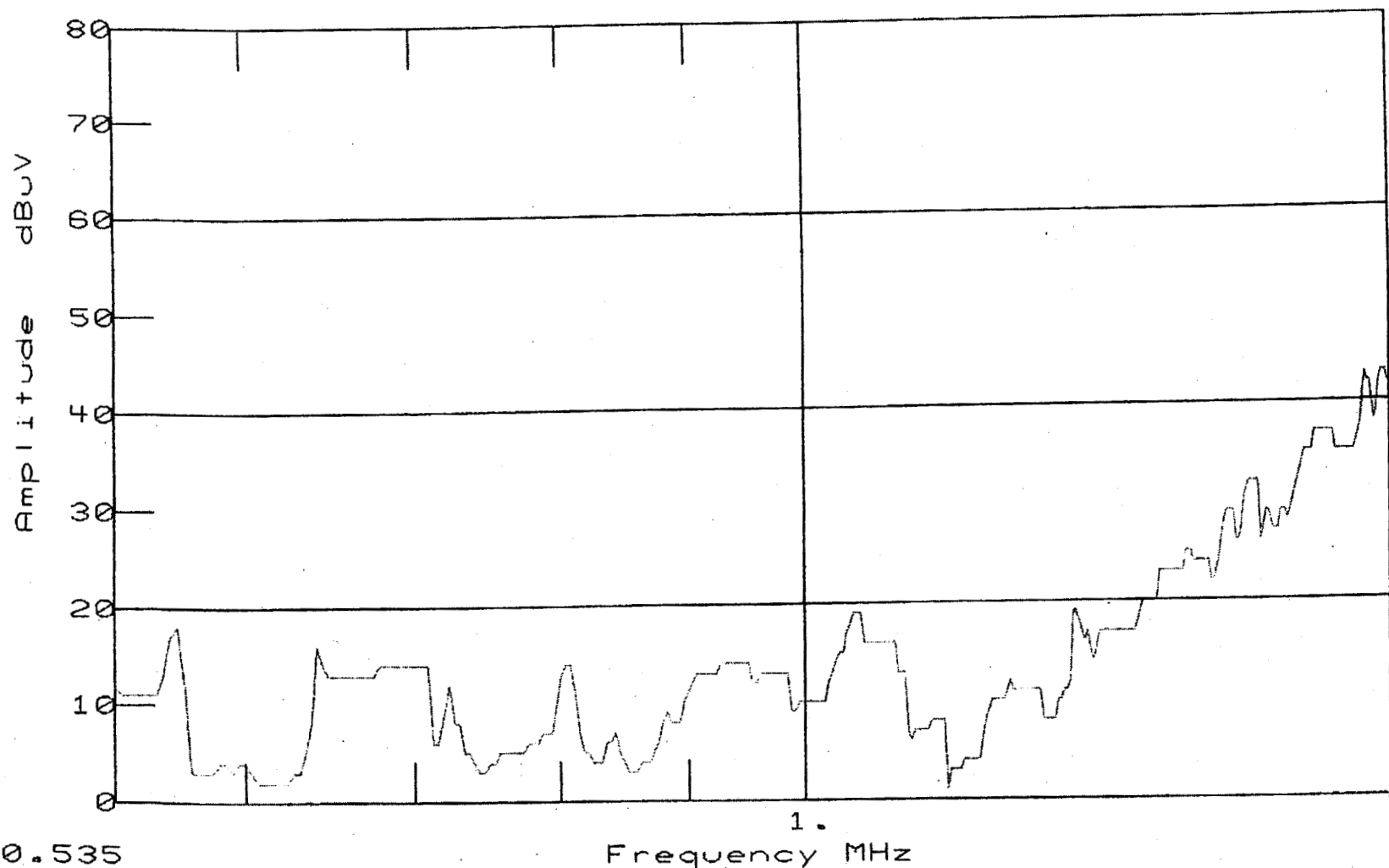
SPECS  
1) Carrier Current FCC  
2)  
3)  
4)

Comment : 120V, 60HZ

ANTENNA  
FILES

OTHER  
FACTORS

E-M



A7

TEST TITLE:MAIN.NET PLC.INC	PAGE 1
DATA FILE :332_L.D30	Freq.(MHz)
Amplitude Units : dBuV	0.5350
Threshold -20 dB	

Freq(MHz)	Amp	CARRIER.S30 vs Spec(dB)
1.6642	41.0	-19.000 *
1.6675	43.0	-17.000 *
1.6709	42.0	-18.000 *
1.6743	42.0	-18.000 *
1.6776	40.0	-20.000 *
1.6877	42.0	-18.000 *
1.6911	43.0	-17.000 *
1.6945	43.0	-17.000 *
1.6979	43.0	-17.000 *
1.7012	42.0	-18.000 *
1.7046	42.0	-18.000 *
1.7050	42.0	-18.000 *

AB



# Product Safety Engineering

MAIN.NET PLC, INC

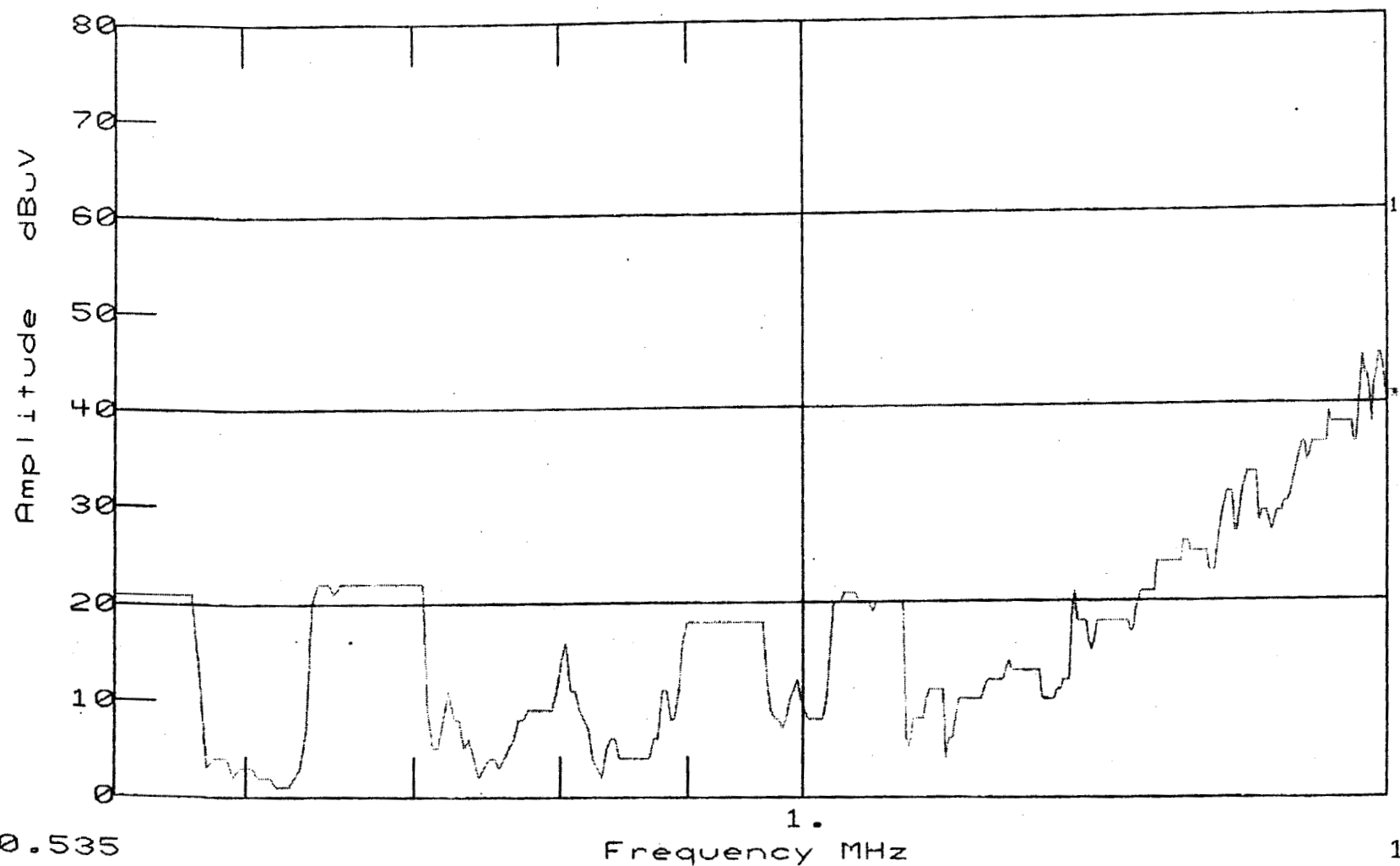
Date : 07/23/03  
Technician : CHIP FOERSTNER  
Test Method : FCC PART 15  
Equipment : NT PLUS 3.0  
Mode of Op. : TX AT POWER LEV#5  
Serial No. : PN PLS10010-000

Time : 13:34:53.68  
Test Equip. : EMC-30  
Test Number : 1  
Sensor Loc. : NEUTRAL  
Sensor Pol. :  
Ext. Atten. : 0 dB

EMC-30 SETTINGS  
Detector QuasiPeak  
Bandwidth CISPR  
Dump/Dwell IN/A  
RF Atten. 10 dB  
IF Atten. 10 dB

SPECS  
1) Carrier Current FCC  
2)  
3)  
4)

Comment : 120V, 60HZ



ANTENNA  
FILES

OTHER  
FACTORS

E-M

A9